

Report for proposed Eskom 17 km Mbumbu-Tsakani 132 kV powerline

Bushbuckridge Local Municipality, Ehlanzeni District Municipality, Mpumalanga Province

Farms: Burlington 217KU (portion 0,1,2), Isligton 219KU (portion 0), Eglington 225KU (portion 5,6,8), Ludlow 227KU (portion 0,3), and Edinburg 228KU (portion 0,2).

Fourie, H. Dr heidicindy@yahoo.com

Palaeontological Desktop Impact Assessment: Exemption

Commissioned by: Royal Haskoning DHV

P.O. Box 25302, Monument Park, Pretoria, 0105

012 367 5916

2014/10/27

Ref:



B. Executive summary

Outline of the development project: Royal Haskoning DHV has appointed Dr H. Fourie, a palaeontologist, to undertake a Desktop Paleontological Impact Assessment as part of the Heritage Impact Assessment for –

Eskom Holdings SoC (Pty) Ltd proposes the feasibility of the construction of a new 17 km, 132 kV power line and substation in the Bushbuckridge Local Municipality, Ehlanzeni District Municipality, Mpumalanga Province. The development may entail the construction of pylons, footings and foundations. Several small towns are close by, Hluvukani, Edinburgh, Allandale and Ludlow. The power line will cross over the farms of Burlington 217KU (portion 0,1,2), Islington 219KU (portion 0), Eglington 225KU (portion 5,6,8), Ludlow 227KU (portion 0,3), and Edinburg 228KU (portion 0,2). The Tsakani substation is present on Eglington 225KU.

This project includes several Routes and Alternatives.

Route 1: Purple Route – From Mbumbu substation crossing over Edinburgh 228KU in a north-easterly direction over Burlington 217KU and Islington 219KU, over Ludlow 227KU and ending at the Tsakani Substation.

Route 2: Green Route – From Mbumbu substation crossing over Edinburgh 228KU in an easterly direction, it then turns north over Ludlow 227KU towards the Tsakani Substation.

Tsakani Substation Alternative 1: Close to the township of Hluvukani on Eglington 225KU.

Tsakani Substation Alternative 2: Closer to the township of Hluvukani.

The **National Heritage Resources Act 25 of 1999** requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are protected. The Republic of South Africa (RSA) has a remarkably rich fossil record that stretches back in time for some 3.5 billion years and must be protected for its scientific value. Fossil heritage of national and international significance is found within all provinces of the RSA. South Africa's unique and non-renewable palaeontological heritage is protected in terms of the National Heritage Resources Act. According to this act, palaeontological resources may not be excavated, damaged, destroyed or otherwise impacted by any development without prior assessment and without a permit from the relevant heritage resources authority.

The main aim of the assessment process is to document resources in the development area and identify both the negative and positive impacts that the development brings to the receiving environment. The PIA therefore identifies palaeontological resources in the area to be developed and makes recommendations for protection or mitigation of these resources.

This report prescribes to the Heritage Impact Assessment of Section 38 of the National Heritage Resources Act 25 of 1999.

For this study, resources such as geological maps, scientific literature, institutional fossil collections, satellite images, aerial maps and topographical maps were used. It provides an assessment of the observed or inferred palaeontological heritage within the study area, with recommendations (if any) for further specialist palaeontological input where this is considered necessary.

A Palaeontological Impact Assessment is generally warranted where rock units of LOW to VERY HIGH palaeontological sensitivity are concerned, levels of bedrock exposure within the study area are adequate; large scale projects with high potential heritage impact are planned; and where the distribution and nature of fossil remains in the proposed area is unknown. The specialist will inform whether further monitoring and mitigation are necessary.

Types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act, 1999 (No 25 of 1999):

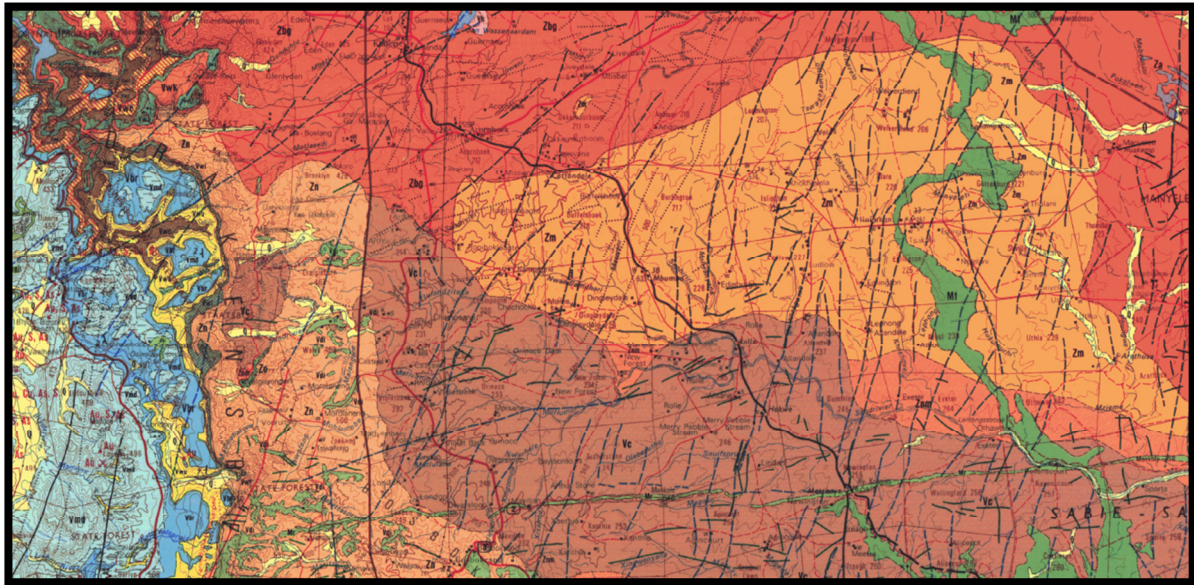
(i) (i) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens.

Section 38, 1(b) requires the details of the construction of a bridge or similar structure exceeding 50m in length.

It is proposed to comment and recommend on the impact of the development on fossil heritage, and if mitigation or conservation is necessary.

Outline of the geology and the palaeontology:

The geology was obtained from the Geological Map of South Africa, 1:100 000 (Visser 1984) and 2430 Pilgrim's Rest 1:250 000 (Walraven 1986).



Legend to Map and short explanation (Walraven 1986).

Zm –Light-grey, medium-grained biotite gneiss with coarse-grained quartz-feldspar leucosomes (orange), Makhutswi Gneiss (Randian).

Mt – Medium to coarse-grained gabbro, olivine gabbro and quartz gabbro (green), Timbavati gabbro (Mokolian).

----- - Lineament (possible dyke).

Summary of findings: The desktop palaeontological impact assessment was undertaken during October 2014 and the following is reported:

The formations present are the Timbavati Gabbro (Mt) and the Makhutswi Gneiss (Zm).

The intrusives of the Randian age are granitoid bodies of the basement complex. The Makhutswi Gneiss is leucocratic migmatite and banded gneiss of granodioritic and tonalitic composition (Kent 1980).

The Kaapvaal Craton has its origin between 3500 and 3000 Ma. There are several complexes, volcanoes and plugs that are of known or assumed Mokolian age, one such intrusive is the Timbavati Gabbro. It is a dyke-like differentiated intrusion containing gabbro and olivine gabbro. The resting place is north-west of Satara, Kruger National Park and good exposures are found along the Timbavati River. Age is determined as 967 ± 4 till 1123 ± 13 Ma (Kent 1980).

Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity is generally LOW to VERY HIGH, but here locally INSIGNIFICANT OR ZERO for the Makhutswi Gneiss.

Recommendation: The impact of the development on fossil heritage is INSIGNIFICANT OR ZERO and therefore mitigation or conservation measures are not necessary for this development. A Phase 1 Palaeontological Assessment is not recommended. The topsoil, subsoil, overburden, inter-burden and bedrock do not need to be surveyed for fossiliferous outcrops, but care must be taken during the digging of foundations when intruding underlying formations.

This project includes several Routes and Alternatives:

Route 1: Purple Route – From Mbumbu substation crossing over Edinburgh 228KU in a north-easterly direction over Burlington 217KU and Islington 219KU, over Ludlow 227KU and ending at the Tsakani Substation.

Route 2: Green Route – From Mbumbu substation crossing over Edinburgh 228KU in an easterly direction, it then turns north over Ludlow 227KU towards the Tsakani Substation.

Tsakani Substation Alternative 1: Close to the township of Hluvukani on Eglington 225KU.

Tsakani Substation Alternative 2: Closer to the township of Hluvukani.

Stakeholders: Developer – Eskom Holdings SoC (Pty) Ltd, 28 c/o vd Merwe and Ferreira Street, Nelspruit, 1200. Tel 013 755 9655 .

Environmental – Royal Haskoning DHV, P.O. Box 25302, Monument Park, 0105. Tel 012 367 5916.

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D. Background information on the project

Report This report is part of the environmental impact assessment process under the NEMA (National Environmental Management Act) [as amended].

Outline of development

Eskom Holdings SoC (Pty) Ltd proposes the feasibility of the construction of a new 17 km, 132 kV power line and substation in the Bushbuckridge Local Municipality, Ehlanzeni District Municipality, Mpumalanga Province. The development may entail the construction of pylons, footings and foundations. The power line will cross over the farms of Burlington 217KU (portion 0,1,2), Islington 219KU (portion 0), Eglington 225KU (portion 5,6,8), Ludlow 227KU (portion 0,3), and Edinburg 228KU (portion 0,2).

This project includes several Options and Alternatives:

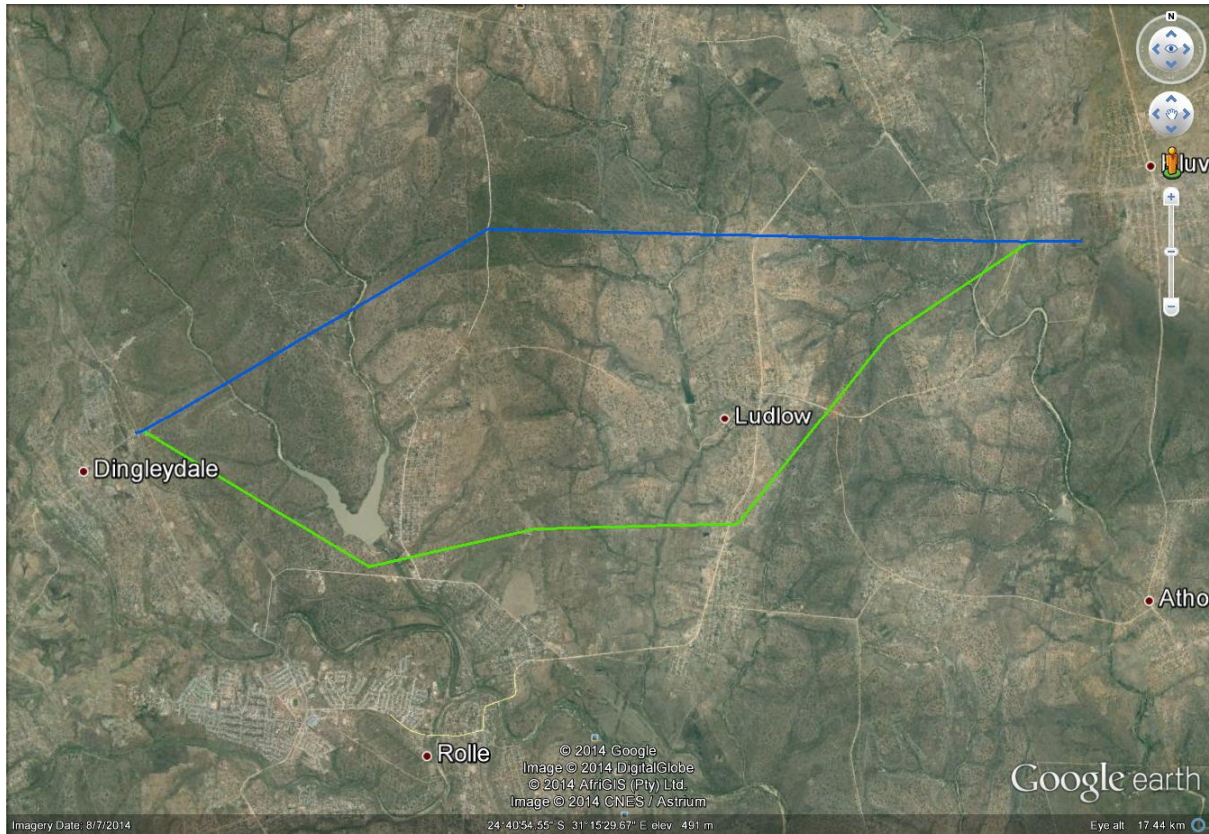
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Google.earth map, elevation 1696 ft. (Provided by Royal Haskoning DHV).



Rezoning/ and or subdivision of land: Servitude will be acquired by Eskom.

Name of developer and consultant: Royal Haskoning DHV and Eskom Holdings SoC (Pty) Ltd.

Terms of reference: Dr H. Fourie is a palaeontologist commissioned to do a desktop palaeontological impact assessment to ascertain if any palaeontological sensitive material is present in the development area. This study will advise on the impact on fossil heritage mitigation or conservation necessary, if any.

Dr Fourie obtained a Ph.D from the Bernard Price Institute for Palaeontological Research, University of the Witwatersrand. Her undergraduate degree is in Geology and Zoology. She specialises in vertebrate morphology and function concentrating on the Therapsid Therocephalia. For the past nine years she carried out field work in the Eastern Cape Province and Mpumalanga Province. Dr Fourie has been employed at the Ditsong: National Museum of Natural History in Pretoria (formerly Transvaal Museum) for 20 years.

Legislative requirements: South African Heritage Resources Agency (SAHRA) for issue of permits if necessary. National Heritage Resources Act no: 25 of 1999. An electronic copy of this report must be supplied to SAHRA/PHRA.

E. Description of property or affected environment

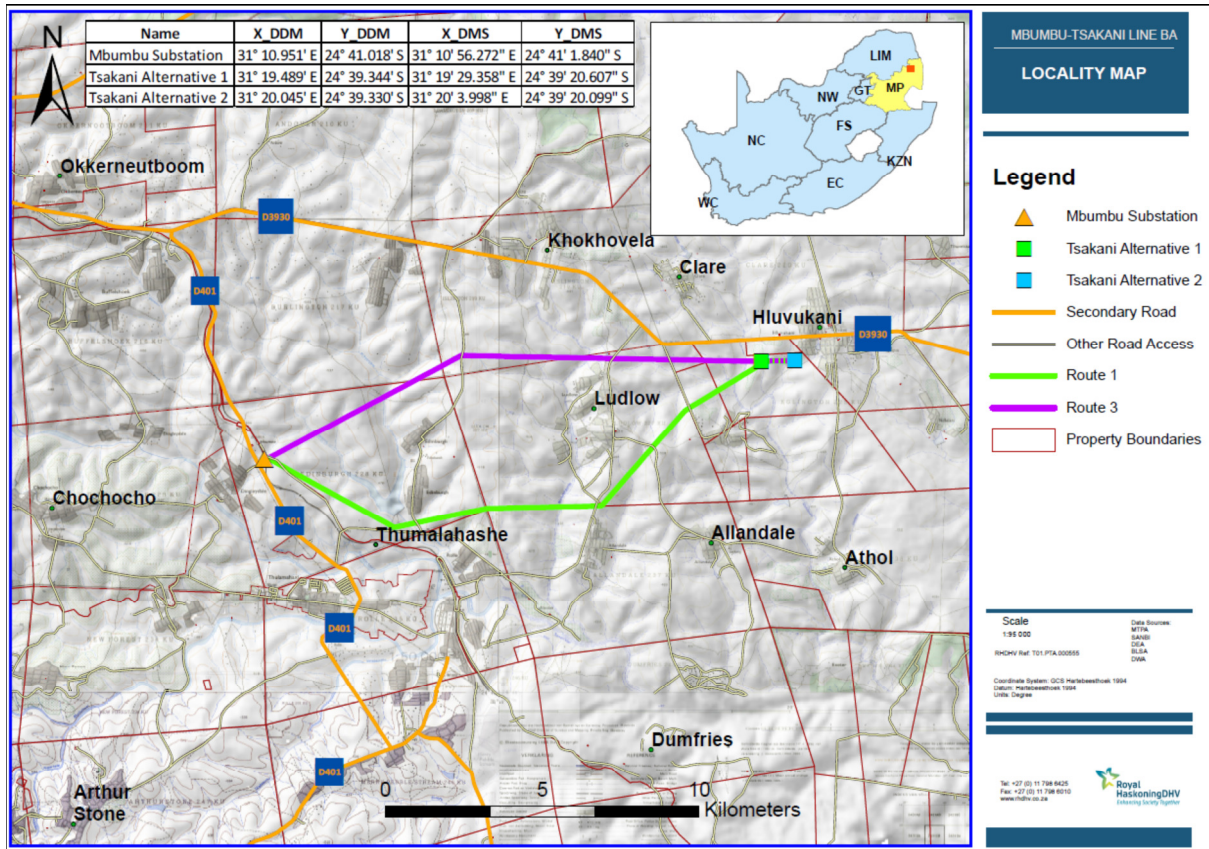
Location and depth:

The development may entail the construction of pylons, footings and foundations. Towns close by are Hluvukani, Edinburgh, Allandale, Rolle and Ludlow.

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There are signs of rural development. Depth of footings and foundations are determined by the structures to be planted or constructed.

Topocadastral Map (Provided by Royal Haskoning DHV).



F. Description of the Geological Setting

Description of the rock units:

The development is taking place in an area covered by the Timbavati Gabbro and the Makhutswi Gneiss.

The intrusives of the Randian age are granitoid bodies of the basement complex. The Makhutswi Gneiss is leucocratic migmatite and banded gneiss of granodioritic and tonalitic composition (Kent 1980). A gneiss is a metamorphic rock containing quartz, feldspar, mica, and rarer dark minerals.

The Kaapvaal Craton has its origin between 3500 and 3000 Ma. There are several complexes, volcanoes and plugs that are of known or assumed Mokolian age, one such intrusive is the Timbavati Gabbro. It is a dyke-like differentiated intrusion containing gabbro and olivine gabbro. The resting place is north-west of Satara, Kruger National Park and good exposures are found along the Timbavati River. Age is determined as 967 ± 4 till 1454 ± 59 Ma (Kent 1980). Low ridges present in the southwestern portion of the Kruger National Park are composed of neatly piled boulders of dark grey to black rock. They are in fact dykes, formed by basaltic magma about 1,100 million years ago. They represent a significant event in the history of the Kaapvaal-Zimbabwe Craton (McCarthy and Rubidge 2005). A gabbro is a mafic igneous rock that is dark coloured, containing abundant dark minerals plus feldspar.



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G. Background to Palaeontology of the area

Summary: When rock units of moderate to high palaeontological sensitivity are present within the development footprint, a desktop and or field scoping (survey) study by a professional palaeontologist is usually warranted. The main purpose of a field scoping (survey) study would be to identify any areas within the development footprint where specialist palaeontological mitigation during the construction phase may be required (SG 2.2 SAHRA AMPHOB 2012).

Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity is generally LOW to VERY HIGH, but here locally INSIGNIFICANT OR ZERO for the Makhutswi Gneiss.

Criteria used (Fossil Heritage Layer Browser/SAHRA):

Rock unit	Significance/vulnerability	Recommended action
Kaapvaal Craton	Insignificant or Zero	No palaeontological studies are required
Timbavati Gabbro	Insignificant or Zero	No palaeontological studies are required
Makhutswi Gneiss	Insignificant or Zero	No palaeontological studies are required

Databases and collections: Ditsong: National Museum of Natural History.

Impact: INSIGNIFICANT OR ZERO. There are no significant fossil resources that may be impacted by the development.

H. Description of the Methodology

The desktop palaeontological impact assessment scope was undertaken during October 2014.

Assumptions and Limitations:-

The accuracy and reliability of the report may be limited by the following constraints:

1. Most development areas have never been surveyed by a palaeontologist or geophysicist.
2. Variable accuracy of geological maps and associated information.

3. Poor locality information on sheet explanations for geological maps.
4. Lack of published data.
5. Lack of rocky outcrops.
6. A site visit was not conducted.
7. Insufficient data from developer and exact lay-out plan for all structures.

I. Description of significant fossil occurrences (Heritage value)

All Karoo Supergroup geological formations are ranked LOW to VERY HIGH, but here the impact is potentially INSIGNIFICANT OR ZERO for the Timbavati Gabbro and the Makhutswi Gneiss (Almond *et al.* 2013).

J. Recommendation

- a. There is no objection to the development, and it is not necessary to request a Phase 1 Palaeontological Impact Assessment to determine whether the development will affect fossiliferous outcrops as the palaeontological sensitivity is INSIGNIFICANT OR ZERO. A Phase 2 Palaeontological Mitigation will only be required if the Phase 1 Palaeontological Assessment finds fossiliferous outcrops. Exemption is given.
- b. This project will benefit the economy, the growth of the community and social development in general.
- c. Preferred choice: None, all the Options and Alternatives are possible as the impact is insignificant or zero.
- d. The following should be conserved: if any palaeontological material is exposed during digging, excavating, drilling, or blasting or caves are found SAHRA/PHRA must be notified. All construction activities must be stopped and a palaeontologist should be called in to determine proper mitigation measures.

Sampling and collecting:

Wherefore a permit is need from the South African Heritage Resources Agency (SAHRA).

- a. Objections: None.
- b. Conditions of development: See Recommendation.
- c. Areas that may need a permit: No.
- d. Permits for mitigation: Needed from SAHRA / PHRA - none.

K. Conclusions

- a. All the land involved in the development was assessed and none of the property is unsuitable for development.
- b. All information needed for the Desktop Palaeontological Impact Assessment scope was provided by the Consultant.
- c. Areas that would involve mitigation and may need a permit from the South African Heritage Resources Agency are discussed.
- d. The following should be conserved: if any palaeontological material is exposed during digging, excavating, drilling or blasting, SAHRA must be notified. All development activities must be stopped and a palaeontologist should be called in to determine proper mitigation measures. Especially shallow caves.
- e. Condition in which development may proceed: It is further suggested that a Section 37(2) agreement of the Occupational, Health and Safety Act 85 of 1993 is signed with the relevant contractors to protect the environment and adjacent areas as well as for safety and security reasons.

L. Bibliography

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SG 2.2 SAHRA APMHOB Guidelines, 2012. Minimum standards for palaeontological components of Heritage Impact Assessment Report, Pp 1-15.

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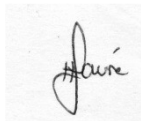
WALRAVEN, F. (Ed.) 1986. Geological Map 2430 Pilgrim's Rest, 1:250 000. South African Committee for Stratigraphy, Council for Geoscience.

Declaration

I, Heidi Fourie, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development project for which I was appointed to do a palaeontological scope. There are no circumstances that compromise the objectivity of me performing such work.

Heidi Fourie accepts no liability, and the client, by receiving this document, indemnifies Heidi Fourie against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the use of the information contained in this document.

This report may not be altered in any way and any parts drawn from this report must make reference to this report.



Heidi Fourie
2014/10/27